THURSDAY, DECEMBER 18, 1873

THE TRANSIT OF VENUS EXPEDITIONS

SOME time ago we called attention to the admirable opportunity which would be afforded by the approaching Astronomical Expeditions for the observation of the Transit of Venus to investigate the Natural History of several little-known islands of the Pacific. The addition of one or two members to these expeditions could make but a comparatively trifling addition to the expense, and while the Astronomers were observing, the Naturalists would be busily employed in collecting. We are glad to be informed that at a recent meeting of the Council of the Royal Society it was determined to take action in this matter, and to advise the Government to attach a small staff of Naturalists to the two expeditions destined to observe the transit in the Island of Rodriguez and Kerguelen's Land. There can be little doubt, we presume, that the Government will readily accede to the advice thus offered to them.

Rodriguez, an outlier of the Mascarene group, is in many ways specially worthy of thorough investigation. As a general rule oceanic islands lying at a distance from the great continents are of volcanic origin. The Seychelles and the island of Rodriguez are almost the only known exceptions to this rule. Rodriguez, so far as the slight information we possess on the subject extends, is believed to be composed of granite overlaid by limestone and other recent rocks. It is, therefore, of great importance that an accurate geological examination should be made of this island, more especially as its nearest neighbours Bourbon and Mauritius follow the ordinary rule of being volcanic. A second rich field of biological research in Rodriguez will be found in the fossil remains to be met with in the caves of the limestone rocks. These have already yielded good fruit to the investigations of Mr. Edward Newton. the Colonial Secretary of Mauritius, aided by grants from the British Association. The complete skeleton of *Pezophaps solitaria*, a bird allied to the Dodo of the Mauritius—has been restored from these remains, as is well-known from the excellent memoir upon this extinct bird published by Mr. Newton and his brother, Prof. Newton of Cambridge, in the Philosophical Transactions of the Royal Society. But besides additional bones of the Solitaire, which will be welcome to many Museums, it will be desirable to become acquainted with the other animals which were the Solitaire's fellow-creatures when in existence. Some of these are also obscurely known through the exertions of the Messrs. Newton, but it cannot be doubted that ample materials of this kind are still lying hid in the caves of Rodriguez for the benefit of future explorers.

The recent Zoology and Botany of Rodriguez also merit thorough investigation in order to ascertain whether they show any parallel differences to that of its geological structure as compared with the rest of the Mascarene group of islands.

Kerguelen's Land, the second point selected for biological investigation, is also likely to give ample occupation for a naturalist who will be able to devote several months to its exploration, while the necessary preparations are being made for the observation of the great astronomical event. In 1840 Kerguelen's Land was visited by the Antarctic Expedition under Sir James Ross. The distinguished naturalist who accompanied the expedition ascertained that it contains a scanty land-flora of flowering plants, some of which belong to types elsewhere unknown, and an extraordinary profusion of marine forms of both the animal and vegetable kingdoms. Of the land-plants a good series was obtained, but as regards the marine flora and fauna much must remain to be done—especially as Sir James Ross's visit took place in mid-winter. The *Challenger* will visit Kerguelen's Land early next year in order to ascertain the best station for an Astronomical Observatory, and her excellent staff of naturalists will, without doubt, not neglect the opportunity thus given to them. But looking to the great size of the island, which measures nearly 100 miles by 50, and to what is reported of the excessive richness of the marine forms of life, there will certainly be ample occupation left for the naturalist whom it is proposed to send there along with the Transit expedition.

There is, in fact, no doubt that it would be difficult to find two spots on the earth's surface where investigation is more likely to lead to satisfactory results than in the case of these two little-known islands. Nor is the opportunity now offered of obtaining these results at a very small cost to the nation likely to recur, if now neglected. We trust, therefore, that on the part of the Government there will be no hesitation in acceding to the scheme put before them by the Council of the Royal Society.

ELLIS'S LIFE OF COUNT RUMFORD

Memoir of Sir Benjamin Thompson, Count Rumford, with Notices of his Daughter. By George E. Ellis. (Published in connection with an edition of Rumford's complete Works by the American Academy of Arts and Sciences. Boston.)

THIS biography supplies a want that has been sorely felt by all who have desired to obtain a reliable account of Count Rumford's eventful life. It is, I think, impossible to name any equally eminent man of modern times concerning whom so little was known before the publication of this work. The only preceding sources of information, Prof. Pictet's letters, Prof. Renwick's sketch in "Sparks's Library of American Biography," Cuvier's *Eloge* and the Cyclopædia biographies made up from these and each other, are most vexatiously contradictory on points of primary interest. Aided by Rumford's own correspondence, and other original and direct sources of information, Mr. Ellis's industry has at last rescued us from these perplexities.

The career of scientific notables is usually of a simple and uneventful character, but that of the poor schoolmaster of New Hampshire is sufficiently adventurous and romantic to supply materials for a sensation-novel writer.

He married early; to quote his own words—"I took a wife, or rather she took me, at 19 years of age." He describes his married life as both happy and profitable, but it lasted scarcely three years, during which he became a prominent public man and a full-blown soldier, with the rank of major at 20 years of age. The part he took in connection with the American rebellion excited popular indignation against him, led to his imprisonment, the confiscation of his property, and his subsequent flight from home shortly after the birth of his daughter. He never saw his wife again, nor did he see his daughter until 20 years afterwards, when she rejoined him in Europe.

At the age of 23, he appears in a new character upon another scene. He is now a diplomatist, presenting his first state paper to Lord George Germaine in London. He steps at once into a responsible position in the Colonial Office, and presently becomes the "Secretary of Georgia." In the meantime he is doing important scientific work, is elected Fellow of the Royal Society in 1779, when 26 years of age, and suddenly appears on board the *Victory* as a volunteer sailor under Sir Charles Hardy, experimenting with ship's guns, and writing treatises on naval signals and naval architecture. In the following year he is promoted to the office of "Under Secretary of State for the Northern Department" (Colonial).

Thirteen months after this he re-appears in military uniform as Lieut.-Colonel Thompson commanding "The King's American Dragoons," and profoundly occupied with experiments upon light artillery, &c. Before 1781 is ended, we find him on the other side of the Atlantic with his dragoons on Long Island, and fighting in the neighbourhood of Charleston at the beginning of 1782. In April we hear of him in New York, and presently find that he has returned to England promoted to the rank of full colonel, and otherwise honoured for his American services.

In the midst of all this activity and excitement he is busily engaged in scientific research chiefly upon subjects connected with gunpowder, bullets, and artillery. With his characteristic exaltation of present pursuits he is now consumed by military ardour, and, dissatisfied with his late inglorious outpost skirmishing in America, obtains appointment for active service in the defence of Jamaica against the French, but is frustrated by the temporary pacific re-action that suddenly prevails. He offers to serve in India, but the Government has become economical. Determined to fight somebody, he selects the Turks, with whom Austria is temptingly disposed to quarrel, and, having obtained the King's permission, proceeds to Vienna, with war-horse, arms, and uniform. Halting on his way he creates considerable sensation by appearing as a visitor on the garrison parade at Strasburg, displaying his handsome figure, brilliant English uniform, and his skilful management of an English blood-horse. Field-Marshal Prince Maximilian de Deux Ponts rides up to the stranger, salutes, and asks a few questions. Thompson, with the polished courtesy and tact of which he is so accomplished a master, turns this introduction to good account, secures the friendship of the Prince, who is so strongly impressed with the varied attainments of the brilliant soldier, that he presses him to pass through Munich on his way to Vienna and visit the reigning Elector of Bavaria, an uncle of the Prince.

The visit is made most successfully, and, with additional introductions, Thompson proceeds to Vienna with a ready-made continental reputation, though only a few weeks old. Here, as he says, "I owe to a beneficent Divinity that I was cured in time of that martial folly." The agent or Divinity of this reformation, was a lady, who, as he says, "formed an attachment to me, gave me wise advices, and imparted a new turn to my ideas, by presenting me in perspective other species of glory than that of conquering battles." It is proper to add, in explanation, that the lady was seventy years of age.

In the meantime the Elector of Bavaria invites Thompson to enter his service. For an English officer to do this, permission from the king was necessary. This was obtained in London, and with it the honour of knighthood, which was conferred in February 1784, with a continuance of half-pay as colonel.

Sir Benjamin Thompson proceeds immediately to Munich, and there enters upon the most remarkable part of his extraordinary career. The task which he set before himself in Bavaria was nothing less than a complete reformation and re-organisation of the army, and a general improvement of the physical and social condition of the whole nation. Invested with full powers by the Elector he sets about his work in a strictly philosophical manner. The first four years—1784 to 1788—are devoted to a cool, impartial, and systematic investigation of the social statistics and general condition of all classes, civil and military, in Bavaria. Having thus inductively collected and generalised his data, he now proceeds deductively to devise his remedies for the evils thus demonstrated. In all his efforts, from the improvement of saucepan-lids and gridirons to the moral reformation of a whole nation of human beings, he is rigidly methodical and strictly scientific, and his success follows as a direct and visible consequence of this scientific mode of proceeding.

His well-known and important researches on the Convection and general Transmission of Heat were undertaken and carried out mainly for the purpose of determining the best and most economical means of clothing the Bavarian soldiers, and the construction, warming and ventilation of their barracks. Another equally important though less known series of researches were instituted for the purpose of learning how to feed in the most economical manner the beggars, rogues, and vagabonds, whose sustenance and reformation he had projected.

His success in reorganising both the men and materials of the army was marvellous. It was in the course of his work in erecting cannon foundries and remodelling the Bavarian artillery that his celebrated demonstration of the immateriality of Heat was suggested.

It may safely be affirmed that the foundation of the present military system and of the recent military successes of Germany was laid by Benjamin Thompson in Bavaria. He tells us that the fundamental principles upon which he proceeded were "to unite the interest of the soldier with the interests of civil society, and to render the military force, even in times of peace, subservient to the public good;" and further, "that to establish a respectable standing military force which should do the least possible harm to the population, morals, manufactures, and agriculture of the country, it was necessary *to make soldiers citizens, and citizens soldiers*."

Besides the important technical reforms of discipline, arms, barracks, quarters, military instruction, &c., which he carried out, "schools were established in all the regiments, for the instruction of the soldiers in reading, writing, and arithmetic, and into these schools not only the soldiers and their children, but also the children of the neighbouring citizens and peasants were admitted gratis." Military schools of industry were also established where the soldiers learned useful trades; thus the military clothing was spun, woven, and made up by the soldiers themselves; roads and other public works were made and erected, and the men were permitted to hire themselves out in garrison towns. Besides this the soldiers were used as industrial missionaries for the introduction of improvements in agriculture, manufactures, &c. The potato, until then almost unknown in Bavaria, was thus introduced by the aid of Thompson's military gardens or model farms. One of these gardens still remains, viz. the well-known "English Garden" at Munich.

Still more remarkable was his success in radically curing the overwhelming curse of Bavaria, which was infested with hordes of beggars and vagabonds that had defied every previous effort of suppression or diminution Here again the same strictly philosophical method of proceeding was adopted. Human materials and motives were handled precisely as we manipulate the physical materials and forces of the laboratory, and the results were similarly definite, reliable, and successful. The scientific social reformer not only cleared the country of its rogues, vagabonds, and beggars, but made their industry pay all the expenses of their own feeding, housing, and clothing, besides those of the industrial and general education of themselves and their children. In addition to all this they made clothing for the military police who took them into custody, and earned a handsome net profit in hard cash.

It is not surprising that such success should have earned for him a long list of Bavarian honours and titles which need not be here recounted, and that he should now appear as "Count of the Holy Roman Empire and Order of the White Eagle," or, as better known to us, in the title of his own choice, "The Count of Rumford." Neither need we be surprised that his health should fail, and that in spite of repose and change of scene we next find him lying dangerously ill at Naples.

On his recovery he returns to England, and while busily engaged there in literary and scientific work, is suddenly recalled to Munich, which now has the Austrians at its gates, and is simultaneously threatened by the French. Matters become so serious that the Elector saves himself by flight, only eight days after Rumford's arrival; but before leaving the monarch hands over to the philosopher the command-in-chief of the army, and the practical dictatorship of the capital. During the three months of this supreme command Rumford succeeds in overawing and checkmating both French and Austrians, and saving the city, after which the Elector returns.

This is the climax of the great philosopher's career, and now we find him a second time stricken by dangerous illness. On recovering he returns to London, founds the Royal Institution, publishes his essays, and then leaves England for the last time to reside in Paris, where he marries the "Goddess of Reason," Madame Lavoisier.

Here the curtain falls upon all his greatness, for though but fifty-two years of age, the brilliant career of the Count of Rumford is ended, and the subsequent scenes of his life display a miserable contrast with all that preceded them.

His biographers are evidently puzzled by what follows, and painfully seek apologies for his matrimonial squabbles, his general irritability, his morose seclusion, and the small results of the fussy labours of the last ten years of his life. My own theory is that the illness at Munich—where he describes himself as being "sick in bed, worn out by intense application, and dying, as everybody thought, a martyr to the cause to which I had devoted myself"—was followed by chronic and permanent cerebral disease, and that the gradually developing change of character which he displayed from the date of his return to England in 1798, until his death in 1814, was but a natural symptom of this growing malady.

Present space does not permit me to state in detail the evidence upon which I base this conclusion, but I cannot conclude without protesting against the explanation of Cuvier, who in his *Eloge* states that "It would appear as if, while he had been rendering all these services to his fellow-men, he had no real love or regard for them. It would appear as if the vile passions which he had observed in the miserable objects which he had committed to his care, or those other passions, not less vile, which his success and fame had excited among his rivals, had embittered him towards human nature." Cuvier, if I am right, only knew the diseased wreck of the brilliant, courteous, and even fascinating "soldier, philosopher, and statesman," and I suspect that the unjust oblivion of his merits which so speedily followed his death, was largely due to the bad impression made, not only upon the French Academicians, but also upon his Royal Institution associates, by the moral obliquities and eccentricities due to a diseased brain.

The main interest of the career of this wonderful man appears to me to lie in this, that it affords a magnificent demonstration of the practical value of scientific training, and the methodical application of scientific processes to the business of life. I have long maintained that every father who is able and willing to qualify his son to attain a high degree of success either as a man of business, a soldier, a sailor, a lawyer, a statesman, or in any other responsible department of life, should primarily place him in a laboratory where he will not merely learn the elements of science, but be well trained in carrying out original physical research, such training being the best of all known means of affording that systematic discipline of the intellectual and moral powers upon which all practical success in life depends. The story of Count Rumford's life, and the lesson it teaches, afford most valuable evidence in support of this conclusion, and cannot fail powerfully to enforce it.

This subject is specially important at the present moment, particularly to those Englishmen whose minds are still infested with the shallow foolishness that leads them to believe that scientific men are dreamy theorists, and disqualified for practical business. Let them follow in detail the practical triumphs of this experimental philosopher, and ask themselves candidly whether such success could have been possible had he been trained in the mere word-exalting study of the Greek and Latin classics, instead of the practical school of experimental research.

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